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(58) Field of search

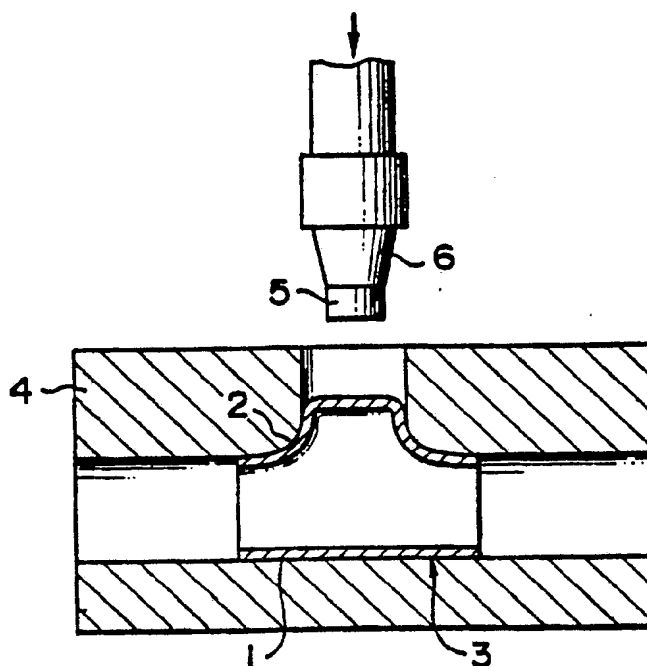
B3A

**Selected US specifications from IPC sub-classes B21D
B23P**

(54) **Method of forming a tee-pipe**

(57) Initially a bulging portion 2 is formed in a direction approximately orthogonal to the axis of a blank pipe by bulge working or other suitable methods, then the head of the bulging portion is opened e.g. by punching with any suitable means 5 and the bulging portion is formed into a branch pipe having a predetermined dimension by an expanding means 6 pressed in to the opening. If a punch 5 is used, it can have an integral expanding portion 6.

FIG. 1



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FIG. 1

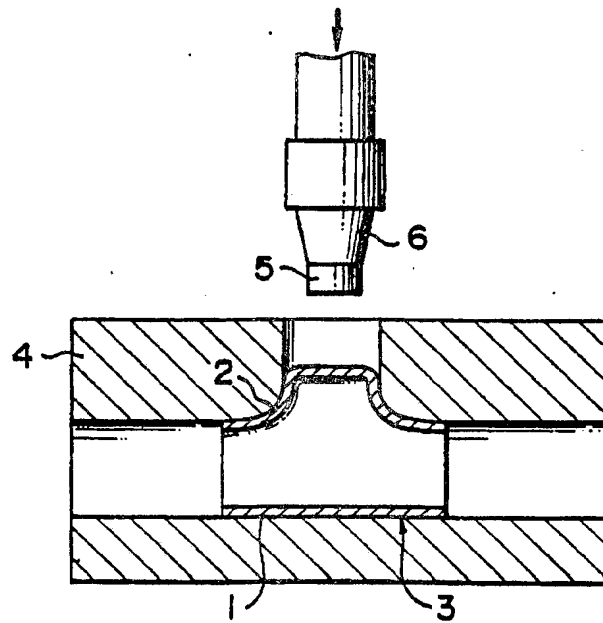
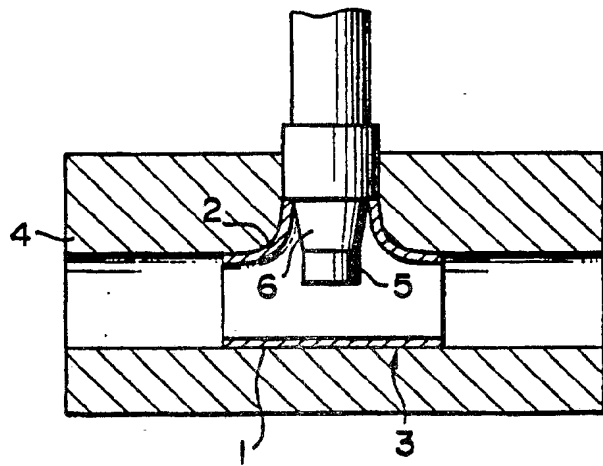


FIG. 2



SPECIFICATION

Method of forming tee pipe

- 5 The present invention relates to a method of forming a tee-pipe, which, for example, may provide a branch path in a fluid pipe path.
- Previously proposed tee-pipes have been manufactured mainly by means of bulge forming.
- 10 In order to ensure the correct length of branch pipe constituting the branch path, a relatively long blank-pipe is preferred within which the bulging portion is formed by extrusion, and which is subsequently cut to size.
- 15 The employment of the forming method described above giving a large extruded amount causes the formation of wrinkles in the wall of the base pipe side so causing defective products and limiting the thinning of the wall
- 20 thickness of the base pipe when a thin wall branch pipe is to be formed and the diameter difference between said branch pipe and the base pipe is large. Also, since a large extruded amount is needed as mentioned above,
- 25 the inner diameter of the base pipe may be made too small to fall within the desired joint tolerances. In this case, the inner diameter of the base pipe must be worked at the ends thereof and the presence of the worked inner
- 30 portions has presented problems in that liquid can collect in the pipe line and cause corrosion.
- In order to solve the problems noted above, the present invention proposes a method of
- 35 forming a tee-pipe comprising the steps of forming a bulging portion in the direction approximately orthogonal to the axis of a blank pipe by means of bulge working or other suitable methods, then opening the head of said
- 40 bulging portion, and forming said bulging portion into a branch pipe having a predetermined dimension by an expanding means pressed into the opening. When carrying out the present invention, the step of opening the head
- 45 can be performed by punching, drilling, the use of a lathe or the like. It is preferred that said expanding means is integral with the means for opening the head and further the opening process and the expanding process of
- 50 the expanding means are carried out continuously in a metal mold for forming the bulging portion on the blank-pipe.

The objects and features of the invention will become apparent from the following detailed description taken in conjunction with the drawings which indicate an embodiment of the invention.

55 Figs. 1 and 2 are explanatory sectional side view showing the sequence of processes of the method according to one example of the present invention, respectively.

Referring to Fig. 1, a tee 3 with a head formed at a bulging portion 2 in the direction approximately orthogonal to the axis of a blank pipe 1 manufactured by means of bulge

working or other methods is placed in a split metal mold 4 which may be longitudinally or laterally split (longitudinally split in the present case), and the top of said bulging portion is punched by a punch 5 mounted on a press (not shown). A tapered portion 6 constituting the expanding means formed connectively with said punch 5 is then pressed into the punched opening to expand the branch pipe and extend

70 the branch of the tee-pipe as shown in Fig. 2.

75 Further, the tee-pipe 3 may, rather than being punched, be drilled by a drill or lathe working or other methods. The punching process and expanding process may also be carried out continuously in the metal mold, in which the bulge forming has been carried out, without using any separate metal mold 4 as described above.

80 Since, compared with prior proposals, the extruded amount can be reduced and the height of the branch pipe can be formed lower and then raised up to a predetermined height by the punch or the like in the process described above, the length of the blank-pipe may be shortened. At the same time, since the extrusion amount is small and thus the increase of wall thickness of the base pipe is less than that of previous methods without reducing the inner diameter of the blank-pipe,

85 both ends of the blank pipe can be made within the desired tolerances without the need for inner diameter working thereof so obviating defects accompanying the inner diameter working. Furthermore, wrinkles are not produced so that thin wall thickness working can be carried out while tee-pipe having a large difference between the base pipe and the branch pipe can also be formed effectively.

CLAIMS

- 105 1. A method of forming a tee-pipe, comprising the steps of:
forming a bulging portion in the direction approximately orthogonal to the axis of a blank pipe by bulge working or other suitable methods;
opening the head of said bulging portion; and
forming said bulging portion into a branch
- 110 pipe having predetermined dimensions by use of an expanding means pressed into the opening.
2. A method of forming a tee-pipe as claimed in Claim 1, wherein said opening is effected by any of a punch, drill, lathe or the like.
- 115 3. A method of forming a tee-pipe as claimed in Claim 1 or Claim 2, wherein said expanding means is integral with the means opening the head.
4. A method as claimed in any one of the preceeding claims wherein said expanding process follows continuously from the opening process.
- 120 5. A method of forming a tee-pipe as
- 125
- 130

claimed in any preceding claim, wherein the opening process and the expanding process are carried out in a metal mold for forming the bulging portion on the blank pipe.

- 5 - 5. A method of forming a tee-pipe which is substantially as herein described with reference to the drawing.

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